IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re patent application of:	) Date: July 1, 2009
Matthew J. Campagna, et al.	) Attorney Docket No.: F-707
Serial No.: 10//736,268	) Customer No.: 00919
Filed: December 15,2003	) Group Art Unit: 3628
Confirmation No.: 3839	) Examiner: Nathan Erb

Title: METHOD AND SYSTEM FOR ESTIMATING THE ROBUSTNESS OF ALGORITHMS FOR GENERATING CHARACTERIZING INFORMATION DESCRIPTIVE OF SELECTED PRINTED MATERIAL SUCH AS A PARTICULAR ADDRESS BLOCK

APPELLANT'S BRIEF ON APPEAL

Sir:

This brief is in furtherance of the Notice of Appeal filed in this case on May 28, 2009.

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I. Real Party in Interest

Pitney Bowes Inc. is the real party interest.

II. Related Appeals and Interferences

United States Patent Application Serial No. 10/736,077 entitled "Method And System For Generating Characterizing Information Descriptive Of Selected Printed Material Such As A Particular Address Block" is presently on Appeal to the Board of Appeals.

III. Status of Claims

(a) Claims 1- 25 are in the application.
(b) Claims 18 - 25 have been cancelled.
(c) Claims 1- 17 are rejected.
(e) Claims 1- 17 are on appeal.

IV. Status of Amendments

An Amendment subsequent to the Final Rejection of March 4, 2009, was filed on April 23, 2009. This Amendment was entered.

V. Summary of Claimed Subject Matter

The present invention relates to the problem of providing a robust, compact characterization of a block of printed text which will distinguish the selected block of text from other such blocks. More particularly, it relates to the problem of estimating the robustness of algorithms for generating characterizing information descriptive of printed material. (By "robust and compact" herein is

meant information which is small enough in quantity to be incorporated into postal indicia yet will identify a text block, and distinguish it from other text blocks, with sufficient reliability to deter “rubber stamp” counterfeiting; despite errors introduced by the printing and/or scanning processes.)

Claim 1 is one of the two independent claims in this Patent Application.

Appellants invention claimed in claim 1, claims a method for selecting a characterizing algorithm for generating a characterizing information descriptor for a selected block of printed material, where said printed material is to be scanned from an object and compared with said characterizing information descriptor at a location distant from where said block is printed. The method includes the following steps:

a) printing said block on an object; (Paragraph 0009, Page 5)

b) applying each algorithm from a predetermined set of characterizing algorithms (Paragraph 0011, Page 6) to a pristine image of said block of printed material to generate a plurality of corresponding first characterizing information descriptors for said block; (Paragraph 0021, Page 9)

c) determining estimates of robustness, (Paragraph 0036, Page 16) with respect to said block of printed material, for each of said algorithms in said set to determine which of said characterizing algorithms is most robust; in order to produce descriptions that match sufficiently when said block of printed material is valid and do not match when said block of printed material is invalid; (Paragraph 0033, Pages 15 and 16) and

d) selecting a descriptor generated by said algorithm and being so determined to be most robust to be used at said distant location. (Paragraph 0034, Page 16)

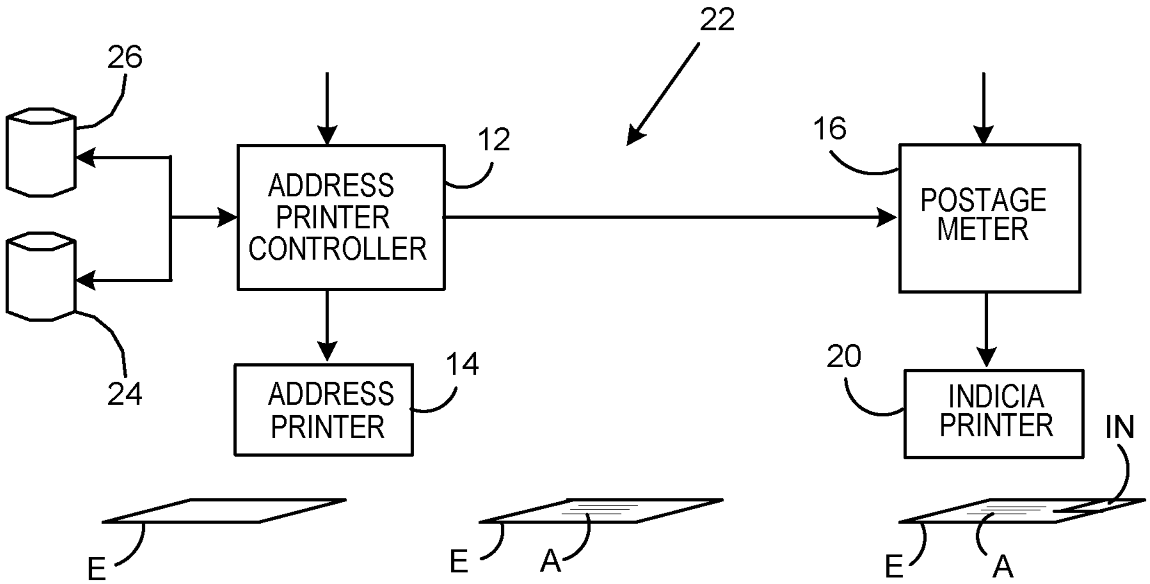
Appellant's invention is shown in paragraph 0009 of page 6 to paragraph 0011 of page 6 and paragraph 0021 of page 9 to paragraph 0046 of page 20. Claim 1 is also illustrated in Figs. 2-7.

[0009] In accordance with another aspect of the subject invention the object is a mail piece and the block of printed material represents an address and the selected descriptor is comprised in an indicium printed on the mail piece; whereby the selected descriptor can be recovered from the indicium for use at the remote location.

[0010] In accordance with another aspect of the subject invention the selected descriptor is one of the second descriptors.

[0011] In accordance with yet another aspect of the subject invention the estimates are determined by filtering the pristine digital image of the block of printed material with a print/scan filter to create a filtered image, the print/scan filter simulating the expected transformation of the pristine image by printing and scanning processes; further filtering the filtered image with one or more defacing filters, the defacing filters simulating simulate blots, smudges, failure of print elements or scanner sensors, or other, similar occasional events which can not easily be incorporated into the print/scan filter to create one or more defaced images; applying each algorithm from the predetermined set of characterizing algorithms to the filtered image and to the one or more defaced images to generate a plurality of corresponding second characterizing information descriptors for the filtered digital image and one or more pluralities of defaced image descriptors corresponding to each of the one or more defaced images; and for each algorithm from the predetermined set of characterizing algorithms, comparing corresponding first characterizing information descriptors with corresponding second characterizing information descriptors and with each of the one or more corresponding defaced image descriptors to determine which of the characterizing algorithms is most robust.

FIG 2



[0021] In Figure 2, mailing system 22 includes address printer controller 12, address printer 14, postage meter 16, and indicia printer 20, which are substantially similar to the corresponding prior art elements shown in Figure 1. System 22 differs in including data stores 24 and 26 communicating with controller 12. Data store 24 stores a plurality of characterizing algorithms, as will be described further below, and data store 26 stores at least a print/scan filter which, when applied to the pristine image, generates a filtered image which approximates the transformation of the pristine image by the printing and scanning processes. In other embodiments, data store 26 stores one or more defacing filters which simulate blots, smudges, failure of print elements or scanner sensors, or other, similar occasional events which can not easily be incorporated into said print/scan filter to create one or more defaced images. Together, meter 16, printer 20, form secure postal indicia printing system 22.

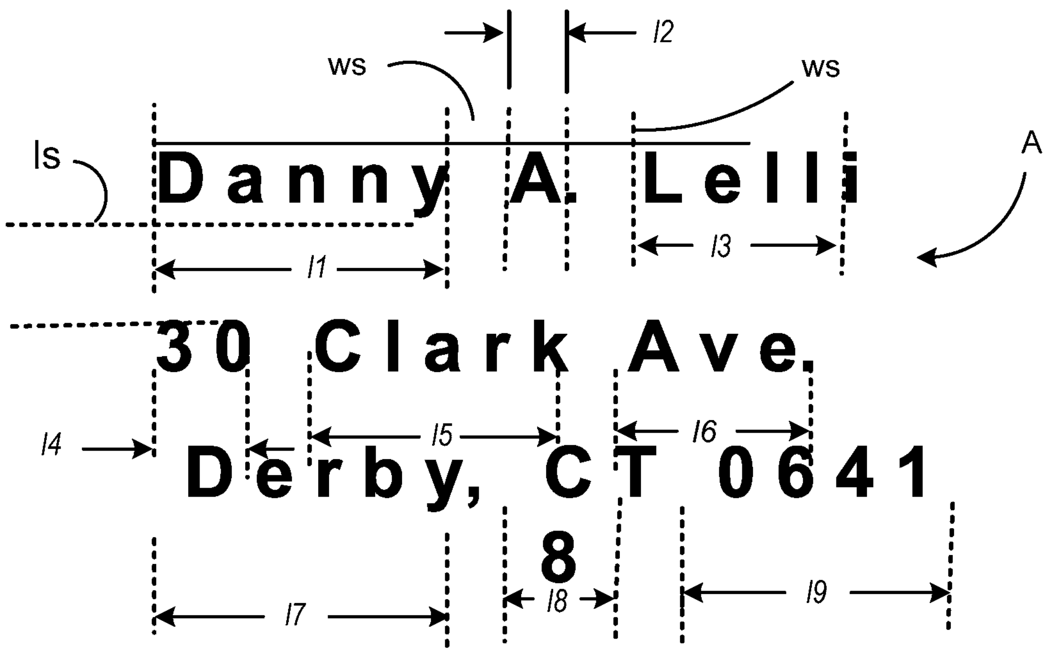
[0022] Three methods for generation of image-based characterizing information, which are believed to provide improved compactness and robustness in accordance with the above object of the invention, have recently been developed by the assignee of the present application and are described below as illustrative of the type of characterizing algorithms which can be used

with the subject invention. Numerous other algorithms will be apparent to those skilled in the art and particular choices of algorithms to be used form no part of the subject invention, except as may be recited in the claims below and equivalents. Each of these methods is believed to provide a sufficiently high likelihood of detection to deter “rubber stamp” counterfeiting, particularly by large scale mailers, while having a sufficiently low rate of false positives that it will not unduly delay mail processing. It is believed that each of these methods will in general provide characterizing information which can be specified by a bit stream of approximately 6 to 12 bytes.

[0023] A characterizing algorithm in which the characterizing information comprises measurements of the lengths of the individual words which make up address A, is shown in Figure 3. Address block A is parsed to identify individual words by first identifying line spaces *ls* by determining the occurrence of large amounts of horizontal white space between blocks of printed text, and then identifying word spaces *ws* by determining the occurrence of large amounts of vertical white space between blocks of printed text (as shown with respect the first line of address A). Word lengths *l*1 through *l*9 are then determined for address A. Preferably, word lengths are taken (measured in pixels) from the edges of word spaces *ws* (or the address edges) as shown, but can be taken in any convenient manner, such as along the midline of the words.

[0024] It is believed that using four or fewer bits per word would not be useful in postal applications. Thus, in a preferred embodiment the number of bits used can be selected to encode all words in the address, and two control bits will be sufficient to indicate selection of five to eight bits per word to encode the length of the word. In other embodiments, a fixed number of words in the address, for example the first eight, can be scanned at a fixed number of bits per word; eight in this case, since control bits would not be needed to specify the number of bits per word.

FIG 3



Example

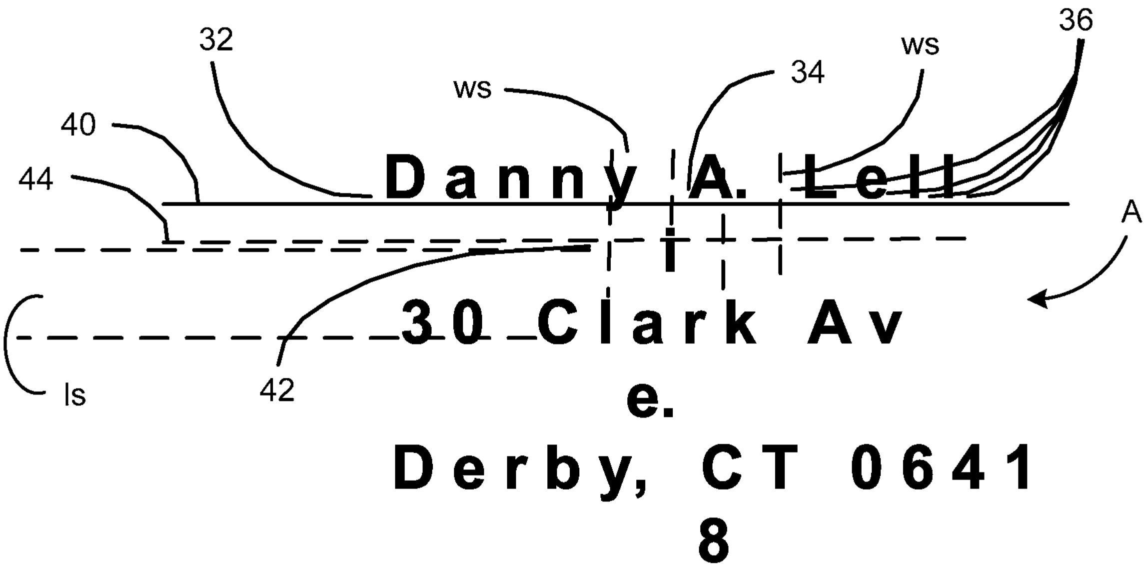
[0025] An address such as shown in Figures 3 – 5 may produce, depending on the print font selected, etc., the following results using six bits per word:

Word#	1	2	3	4	5	6	7	8	9
Length(pixels)	173	45	150	60	154	103	168	68	189

The absolute lengths are then normalized to the range 1 – 63, i.e. 2^0 – (2^6 -1), yielding:

Word#	1	2	3	4	5	6	7	8	9
Length(normalized)	56	1	46	7	48	26	54	11	63

FIG 4



[0026] Another algorithm in which the characterizing information comprises measurements of the number of "outliers" in each word (or each line) that make up address A, is shown in Figure 4. (By "outliers" herein is meant ascenders or descenders and portions capitals of which project beyond thresholds, which are preferably determined by the upper and lower bounds of lower case letters without ascenders or descenders, such as "a", "c", "e", etc.) Address A is parsed to identify individual words, if necessary, by first identifying line spaces *ls* by determining the occurrence of large amounts of horizontal white space between blocks of printed text, and then identifying word spaces *ws* by determining the occurrence of large amounts of vertical white space between blocks of printed text (as shown with respect the first line of address A). Otherwise, only the lines need be identified.

[0027] Assuming six bits are allocated per word, the number of upwards (+) and downwards (-) outliers per word can be encoded as "xxx/yyy" where x

and y are binary digits and xxx is the number of (+) outliers and yyy is the number of (–) outliers.

Example

[0028] Again taking eight bytes as the space allocated for the address block characterizing information, as shown in Figure 4 with respect to the first address line, (+) outliers 32, in word 1; 34, in word 2; and 36, in word 3 are identified as exceeding threshold 40, and outlier 42, in word 1, is identified as exceeding threshold 44. Since for address block A all of the outliers can be encoded in less than 60 bits, the resulting bit stream is:

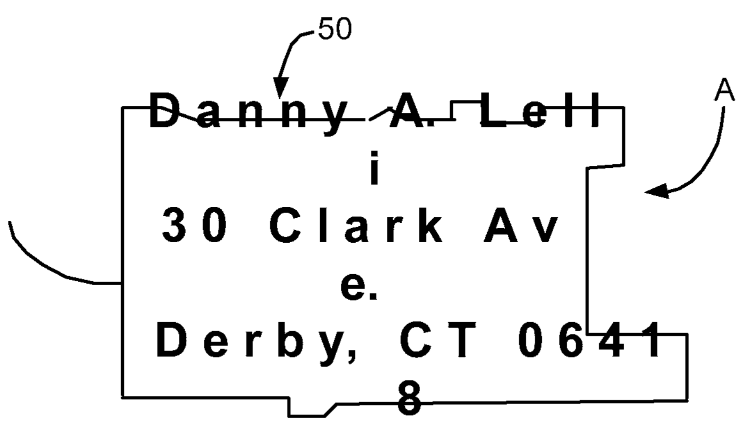
1-001/001-001/000-100/000-010/000-011/000-001/000-010/000-010/000-101/000-111

| | | | | | | | | | |

code word1 word2 word3 word4 word5 word6 word7 word8 word9 end

where code 1 indicates per word characterization and 111 is an end code. (The 111 end code of course implies that no more than six (+) outliers can be recognized in any word, i.e. 110 means 6 or more.)

FIG 5



[0029] Another algorithm in which the characterizing information comprises a description of the shape of the address block is shown in Figure 5. The shape is determined by using a conventional "best fit" scanning algorithm which encloses address block A with "best fit" closed curve 50. (It should be understood that various algorithms for generating a best fit curve will generate different curves. These differences do not affect the subject invention so long as the same algorithm is used to generate the curve whose description is incorporated into the indicium and to recover the curve from the address block when the indicium is validated.) Preferably, curve 50 is constrained. That is the manner in which a curve can be generated and is limited so that the resulting curve is simplified and can be described with limited information. In Figure 5, curve 50 is formed from linked straight line segments, such as segment 51, which are limited to eight "directions", up (U), down (D), left (L), right I, up-right (UR), up-left (UL), down-right (DR), and down-left (DL); viewed as being generated starting in the upper left corner of address block A and traveling clockwise around address block A. Preferably, the curve 50 also accounts for spaces between characters, words and lines, treating these spaces as equivalent to printed space, so that curve 50 does not become too convoluted and require extensive descriptive information. It is within the skill of a person skilled in the art to provide an algorithm which will generate robust and compact characterizing information, as described above.

[0030] The characterizing information, i.e., the description of curve 50, can be encoded in a number of ways. In the present example, the characterizing information consists of only the directions, without lengths, of each successive line segment.

Example

[0031] Encoding line segment directions as:

R = 000, L = 111, U = 001, D = 110, UR = 010, DL = 101, DR = 011, UL = 100;

and starting at the upper left of address block A, curve 50 is described by the bit stream:

000-011-000-010-011-000-001-000-110-000-001-000-110-111-110-000-110-
| | | | | | | | | | | | | | | | |
R DR R UR DR R U R D R U R D L D R D

111-110-111-001-111-001-110
| | | | | | |
L D L U L U D(end)

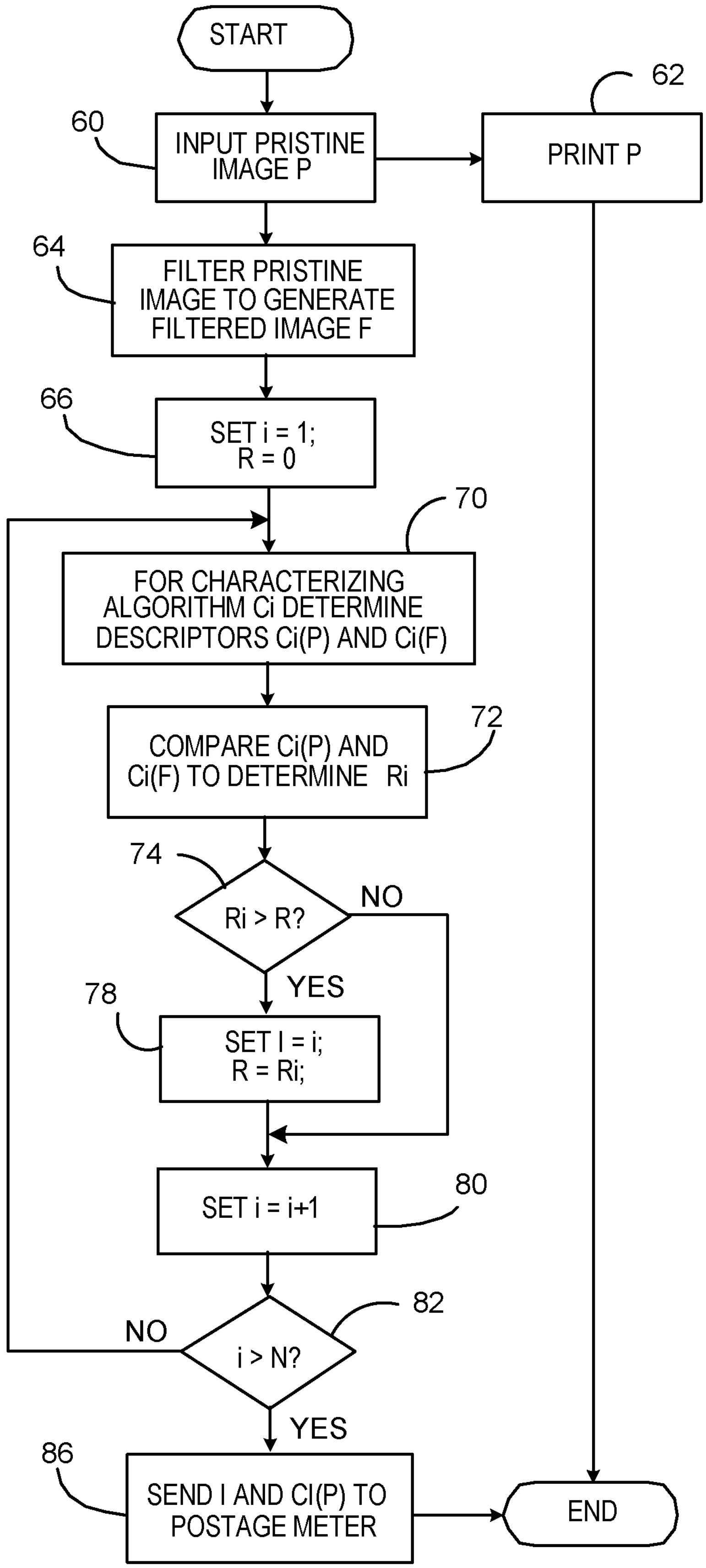
Thus, curve 50 can be described in nine bytes, including an end code, which can be indicated by reversal (or repetition) of the immediately preceding segment direction. Again, this bit stream is incorporated into the indicium.

[0032] Programming of a data processor to analyze scan data to perform imaging operations such as identifying lines and words, measuring the dimensions of letters and words or fitting a curve to an image in accordance with predetermined constraints are well known. Such operations are substantially routine in the character and general pattern recognition arts, for example. Techniques for carrying out such operations are also taught in Handbook of Pattern Recognition and Image Processing edited by T Young and K-S Fu, Academic Press, 1986, and need not be discussed further here for an understanding of the subject invention.

[0033] Bit streams, such as those described above, comprise ordered sequences of values which are typically, though not necessarily, numeric values associated with words in the address block. (Such bit streams are hereinafter sometimes "characterizing information descriptors" or "descriptors", and such values are hereinafter sometimes "characterizations".) As described above,

when an indicium is validated, i.e., tied to the mail piece on which it is printed, at a distant postal facility the descriptor generated from the pristine image and incorporated into the indicium is compared with a descriptor recovered from an image scanned from the address block printed on the mail piece. It will be apparent to those skilled in the art that the recovered image will be transformed with respect to the pristine image by the characteristics of the printing and scanning processes, as well as possibly by the occurrence of occasional events such as blots. Thus, it is important that the algorithm used to characterize the address block be robust, that is, that it produce descriptors that match sufficiently when an indicium is valid, and do not match for invalid indicia, despite small differences between the scanned image and the pristine image. It will also be apparent that the robustness of a particular characterizing algorithm can vary for different address blocks. (As a hypothetical example, the above described algorithm based on word length may be less robust for address blocks printed in a small font while algorithms based on the number of outliers, or address block shape may be relatively insensitive to font size.)

FIG 6


START
60
INPUT PRISTINE IMAGE P
62
PRINT P
64
FILTER PRISTINE IMAGE TO GENERATE FILTERED IMAGE F
66
SET i = 1; R = 0
70
FOR CHARACTERIZING ALGORITHM Ci DETERMINE DESCRIPTORS Ci(P) AND Ci(F)
72
COMPARE Ci(P) AND Ci(F) TO DETERMINE Ri
74
Ri > R?
NO
YES
78
SET I = i; R = Ri;
80
SET i = i+1
82
i > N?
NO
YES
86
SEND I AND CI(P) TO POSTAGE METER
END

[0034] Figure 6 shows a flow diagram of the operation of controller 12 in accordance with one embodiment of the subject invention. At step 60 controller 12 obtains a pristine digital image, P, of address block A from a conventional source (not shown) such as a data processing system for preparing a bulk mailing. At step 62 controller 12 carries out printing of address block A in a conventional manner. Preferably, this printing process is carried out concurrently with the selection of a characterizing algorithm but, in other embodiments of the subject invention, printing of address block A can be carried out sequentially or by a separate processor.

[0035] At step 64, controller 12 inputs a print/scan filter which simulates the printing process of printer 14 and the scanning process to be carried out at a remote postal facility from data store 26 and applies it to image P to generate a filtered image, F, which approximates the image which will be scanned from the mail piece at the postal facility. And at step 66 sets index i equal to 1 and variable R equal to 0.

[0036] At step 70 controller 12 applies the ith characterizing algorithm C_i to images P and F to generate corresponding descriptors $C_i(P)$ and $C_i(F)$; each comprising a sequence of M characterizations, or values, $C_i(P)_1$ through $C_i(P)_M$; $C_i(F)_1$ through $C_i(F)_M$. Then at step 72, controller 12 compares descriptors $C_i(P)$ and $C_i(F)$ to estimate a robustness value R_i for the ith algorithm C_i, with respect to a particular image P.

[0037] The comparison at step 72 is carried out using a comparison algorithm associated with characterizing algorithm C_i and which preferably is the same comparison algorithm used at the postal facility to compare the descriptor recovered from the scanned image with the descriptor incorporated into indicium IN. Preferably the comparison is carried out on a characterization by characterization basis, comparing each $C_i(P)_j$ with the corresponding $C_i(F)_j$ to determine if the characterizations match; i.e. if they are "close enough" as defined by the particular comparison algorithm used. (As a hypothetical

example, where the characterizations are word lengths they may be considered to "match" if the lengths differ by no more than one or two units; while if the characterizations are the number of outliers in a word a "match" may require exact equality.)

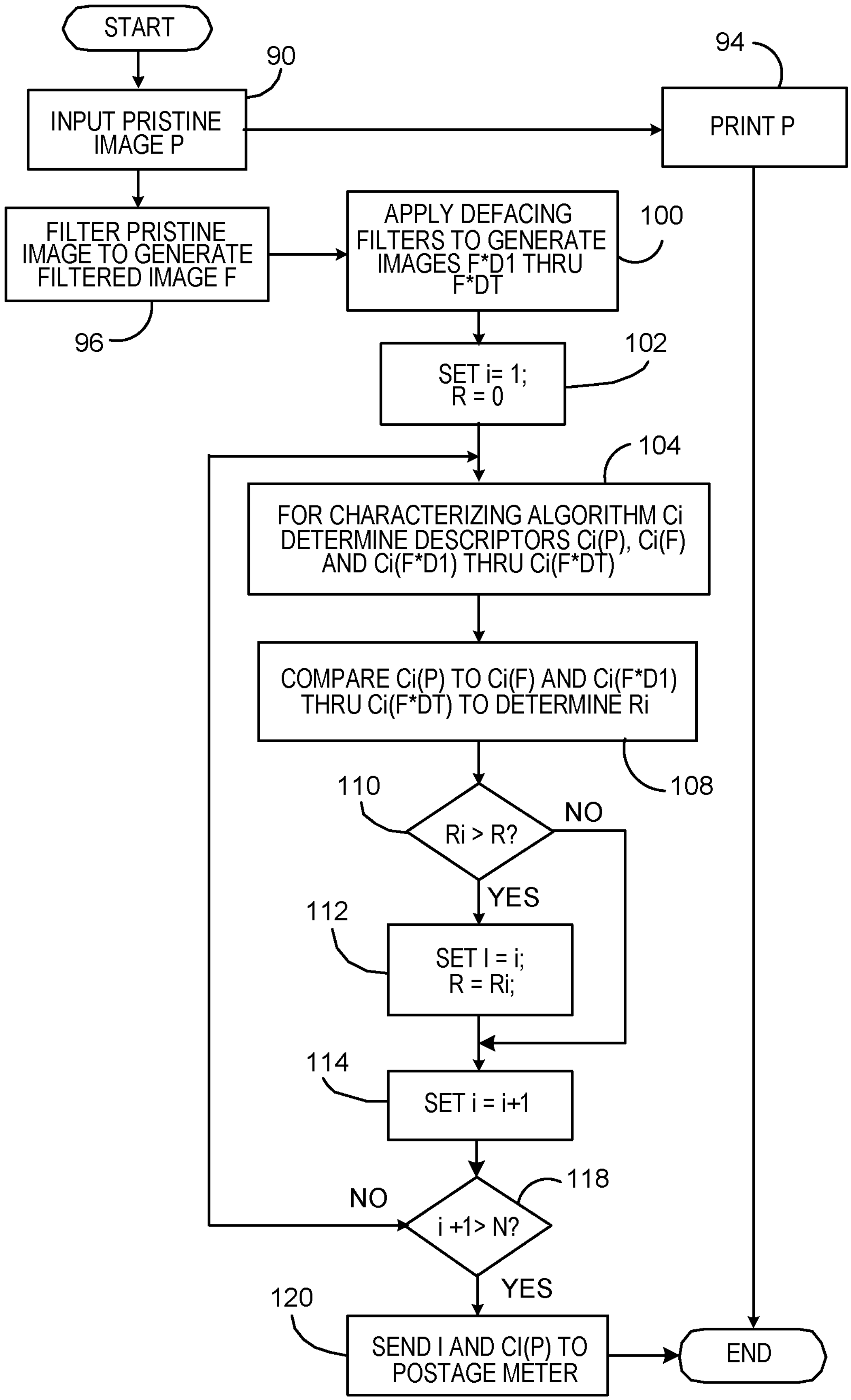
[0038] In a preferred embodiment, once descriptors $C_i(P)$ and $C_i(F)$ have been compared, an estimate R_i for the robustness of algorithm C_i, with respect to particular image P, is calculated as:

R_i = Total no. of $[C_i(P)_j$ matching $C_i(F)_j]/M$ (for j = 1 through M);

where M is the number of characterizations generated by C_i. (Note that since robustness is defined with respect to small changes in the image, in normal use the filters, and the printing and scanning processes, will be such that the descriptors $C_i(P)$ and $C_i(F)$ will have the same number of characterizations. Otherwise an error condition is generated.)

[0039] Once estimate R_i is determined at step 74 controller 12 determines if R_i is greater than variable R and, if so, at step 78 controller 12 sets $R = R_i$ and index value I = i. Then, or immediately if R_i is not greater than R, at step 80 controller 12 sets i = i+1. At step 82 controller 12 determines if i+1 is greater than N, the number of characterizing algorithms stored. If not, controller 12 returns to step 70 to test the next algorithm. Otherwise, at step 86 controller 12 sends I and descriptor $C_I(P)$ to meter 16 in a conventional manner for incorporation into indicium IN. The postal facility can then recover I to identify C_I and use C_I to validate indicium IN in a conventional manner. In other embodiments, descriptors can be self-identified by their format, or, if a relatively small number of algorithms is used, the facility can sequentially test using all algorithms, with the assumption that only the algorithm actually used to generate the descriptor will give meaningful results; so that index value I need not be included in indicium IN.

FIG 7


START
INPUT PRISTINE IMAGE P
90
94
PRINT P
FILTER PRISTINE IMAGE TO GENERATE FILTERED IMAGE F
96
APPLY DEFACING FILTERS TO GENERATE IMAGES F*D1 THRU F*DT
100
SET i= 1; R = 0
102
104
FOR CHARACTERIZING ALGORITHM Ci DETERMINE DESCRIPTORS Ci(P), Ci(F) AND Ci(F*D1) THRU Ci(F*DT)
COMPARE Ci(P) TO Ci(F) AND Ci(F*D1) THRU Ci(F*DT) TO DETERMINE Ri
108
110
Ri > R?
NO
YES
112
SET I = i; R = Ri;
114
SET i = i+1
118
NO
i +1> N?
YES
120
SEND I AND CI(P) TO POSTAGE METER
END

[0040] Figure 7 shows a flow diagram of the operation of controller 12 in accordance with another embodiment of the subject invention. Similarly to the above described embodiment, at step 90, controller 12 obtains pristine digital image, P, of address block A, at step 94 carries out printing of address block A concurrently with the selection of a characterizing algorithm and, at step 96 inputs a print/scan filter.

[0041] At step 100, controller 12 inputs defacing filters D_1 through D_T (described above) and applies each of these filters to filtered image F to generate defaced images F^*D_1 through F^*D_T which approximate scanned images of address blocks which have been defaced by occasional events such as blots. At step 102, controller 12 sets index i equal to 1 and variable R equal to 0.

[0042] At step 104 controller 12 applies the ith characterizing algorithm C_i to images P, F and F^*D_1 through F^*D_T to generate corresponding descriptors $C_i(P)$, $C_i(F)$ and $C_i(F^*D_1)$ through $C_i(F^*D_T)$; each comprising a sequence of M characterizations, or values, $C_i(P)_1$ through $C_i(P)_M$; $C_i(F)_1$ through $C_i(F)_M$, etc. Then at step 108, controller 12 compares descriptors $C_i(P)$ with descriptors $C_i(F)$ and $C_i(F^*D_1)$ through $C_i(F^*D_T)$ to estimate a robustness value R_i for the ith algorithm C_i, with respect to a particular image P.

[0043] In a preferred embodiment, once descriptors $C_i(P)$ and $C_i(F)$ have been compared an estimate R_i for the robustness of algorithm C_i, with respect to particular image P, is calculated as:

R_i = Total no. of: [$C_i(P)_j$ matching $C_i(F)_j$ (for j = 1 through M) +

$C_i(P)_j$ matching $C_i(F^*D_k)_j$/M (for j = 1 through M, k =1 through T)]/M(T+1);

where M is the number of characterizations generated by C_i.

[0044] Again, similar to the embodiment described above, once estimate R_i is determined at step 110 controller 12 determines if R_i is greater than variable R and, if so, at step 112 controller 12 sets R =R_i and index value I = i. Then, or immediately if R_i is not greater than R, at step 114 controller 12 sets i = i+1. At

step 118 controller 12 determines if i+1 is greater than N, the number of characterizing algorithms stored. If not controller 12 returns to step 104 to test the next algorithm. Otherwise, at step 120 controller 12 sends I and descriptor $C_I(P)$ to meter 16 in a conventional manner for incorporation into indicium IN. The postal facility can then recover I to identify C_I and use C_I to validate indicium IN in a conventional manner.

[0045] In other embodiments, whether or not defacing filters are used, descriptor $C_I(F)$ can be incorporated into indicium IN.

[0046] It is anticipated that other estimates for robustness of characterizing algorithms will be developed as experience with different applications is gained or will be apparent to those skilled in the art. Accordingly it should be understood that, except for particular recitations in the claims below and equivalents thereof, details of particular estimates used form no part of the subject invention.

Claim 15 is the second of the two independent claims in this Patent Application.

Appellants invention claimed in claim 15, claims a secure indicia printing system for generating and printing an indicium on an object, said object having other material printed thereon. The system comprises:

a) a printer for printing said indicium; (20, Fig 2, Paragraph 0021, Page 9)

b) a processor for receiving a pristine digital image of said other printed material, and for processing said image to abstract characterizing information descriptive of aspects of said image from said image, said processor being programmed to: (Paragraphs 0021-0023, Pages 9 and 10)

b1) apply each algorithm from a predetermined set of characterizing algorithms to said pristine image of said block of printed material to generate a plurality of corresponding first characterizing information descriptors for said block; , (Paragraph 0011, Page 6)

b2) determine estimates of robustness, with respect to said block of printed material, for each of said algorithms in said set to determine which of said characterizing algorithms is most robust; , (Paragraph 0036, Page 16)

b3) select a descriptor generated by said algorithm and being so determined to be most robust; , (Paragraph 0011, Page 6) and

b4) output said selected descriptor;

c) a meter, said meter communicating with said processor to receive said descriptor, and having a communications link for receiving other information from another information source, and communicating with said printer, (Paragraph 0021, Page 9) for:

c1) cryptographically authenticating said descriptor and other information; (Paragraph 0033, Pages 15 and 16)

c2) generating said indicium to be representative of said cryptographically authenticated descriptor and information; (Paragraph 0033, Pages 15 and 16) and

c3) controlling said printer to print said indicium on said object; , (Paragraph 0021, Page 9) whereby

d) said object's relationship to said indicium can be verified by regenerating said first characterizing information descriptor from said other printed material and comparing said regenerated descriptor with said descriptor recovered from said indicium, and copies of said indicium cannot easily be used without detection on other objects which do not include said other printed material. (Paragraph 0033, Pages 15 and 16)

The portions of Appellant's invention claimed in claim 15, is set forth above.

VI. <u>Grounds of Rejection to be Reviewed on Appeal</u>

A. Whether or not claims 1-4, 6-8,10-12, and 14-25 are patentable under 35 USC § 103(a) over Whitehouse, U.S. Patent No. 6,005,945, in view of Ryan, Jr. et al., U.S. Patent No. 5,871,288, in further view of Pintsov et al., U.S. Patent

No. 6,385,504 B1, in further view of Van Haagen et al., U.S. Patent No. 5,675,137.

B. Whether or not claims 5, 9, and 13 are patentable under 35 USC § 103(a) over Whitehouse in view of Ryan, Jr. et al. in further view of Pintsov et al. in further view of Van Haagen et al. in further view of Ulvr et al., U.S. Patent No. 5,602,382.

VII. Argument

A. Claims 1-4, 6-8,10-12, and 14-25 have been rejected by the Examiner under 35 USC § 103(a) Whitehouse, U.S. Patent No. 6,005,945, in view of Ryan, Jr. et al., U.S. Patent No. 5,871,288, in further view of Pintsov et al., U.S. Patent No. 6,385,504 B1, in further view of Van Haagen et al., U.S. Patent No. 5,675,137.

Whitehouse discloses the following in line 46-65 of col. 6,

> Each end user computer typically includes a data processor and a communication procedure for sending postage requests to a secure central computer at which a user account has been established, and for receiving a corresponding digital postage indicium. A postage indicium printing procedure prints a postage indicium in accordance with the received digital postage indicium. Each postage request will typically include a user account identifier that identifies a previously established user account, a source address identifier indicating where a mail piece is to be mailed from, a destination address identifier indicating where the mail piece is to be mailed to, authentication information for authenticating that the postage request is from an end user associated with the specified user account identifier, and data concerning the package size and/or weight sufficient to determine an amount of postage required for the mail piece. Each digital postal indicia will typically include data representing the user account identifier, source address identifier, and destination address identifier in a corresponding on of the postage requests.

Whitehouse discloses the following in line 66 of col. 14 – line 17 of col. 15.

> For instance, the postage indicium generated by the present invention is only valid for a mail piece with a given meter and serial number, for delivery from a particular ZIP+4 source location to a particular ZIP+4 destination location, and for a particular mail piece

weight and a particular type of delivery service and for mailing on a particular date. Therefore, any attempt to use a stolen or intercepted postage indicium for delivery from or to a different ZIP+4 destination than those associated with the postage indicium would be immediately detected at the processing postal office. Also, even if the interceptor meets the ZIP+4 source and destination requirements, the use of two or more postage indiciums having the same meter number, and serial number will be quickly detected at the processing postal office. Delayed use of the intercepted postage indicium will be blocked by requirements that each postage indicium be used in a timely manner (e.g., within 3 days, or possibly a week of issuance of the postage indicium).

Whitehouse discloses the following in line 30-35 of col. 22.

The mail piece's destination is validating by comparing the destination indication in the postal indicium (e.g., a ZIP+4+2 indication for origins in the United States) with the destination printed on the mail piece (305). If the two do not match, this is a indication of likely fraudulent use of a postal indicium and is treated as such.

Whitehouse discloses the validation of a postal indicuim by comparing the destination indicated in the postal indicium (zip codes) with the destination printed on the mail piece.

Ryan discloses the following in lines 20-30 of col. 2.

In accordance with the present invention a user is given control to increase and decrease a 2-D Bar code module size for an IBIP indicium. It has been found that this may allow the use of recycled paper (or other porous paper) envelopes with liquid ink jet printing. The user alters the module size (and thus the indicium size) which provides low resolution printing. Such user control is from the front panel for a mailing machine, or through the PC interface, such as the keyboard and display, for a PC meter. The present invention further includes the USPS providing feedback to the Vendor based upon print quality of verified indicia.

Ryan discloses the following in lines 46-56 of col. 2.

The present invention provides a method for improving print quality for a 2-D bar code. The method includes determining printer type, including print resolution, for printer that will print 2-D bar code and entering paper type for the envelope. A suggested 2-D bar code module size is calculated based on the paper and the printer type.

A test sample 2-D bar code is printed at the suggested 2-D bar code module size. The printed test sample is scanned and then evaluated for print quality and readability. The method can also suggest a 2-D bar code module size to the user.

Ryan discloses the following in lines 1-31 of col. 4.

Referring now to FIG. 3, an alternate embodiment is described. At step 305, printer information, i.e., printer name and resolution, is obtained from the PC operating system printer driver. At step 310, the user displays a list of known paper types on the PC. At step 315, the user enters the paper type into the PC. A software module in the PC, at step 220, calculates suggested module size based on the paper and printer information, and, at step 325, displays on the PC a list of module sizes and highlights the suggested one. At step 330, a test print message, preferably a 2-D bar code, is printed, and then scanned at step 335. At step 340, the scanned bar code is evaluated for overall print quality. If the print quality is not acceptable, the print evaluation software, at step 350, calculates new suggestions and steps 325 through 340 are repeated. If the print quality is acceptable, the resolution of the module size is set, at step 360, and the printer is ready to print indicia at step 365.

It will be understood that steps 335 through 350 can be performed by the vendor when the user sends the test print message to the vendor. It is further noted that the forgoing process should be repeated periodically to maintain a high print quality.

In accordance with the present invention, one user printing on a high paper quality envelope with a laser printer may receive a recommendation to use a module size of 0.01".times.0.03". Another user printing on a medium paper quality envelope with an ink jet printer (a marginal combination), may receive a recommendation to use a bar code module size of 0.015".times.0.045" module size. The following are sample calculations demonstrating how the change is module size is determined.

Ryan discloses a method for improving the print quality of a 2-D bar code.

Pintsov discloses the following in lines 51 of col. 9 to line 5 of col. 10.

Digital signatures (which include cryptographic hashing) can be provided for files communicated between the carrier service data center and mailer's computer. However, one cannot completely exclude the possibility that the mailpiece unique identifier and its associated address can fall out of synchronization, i.e. mailpiece

> identifiers would be printed on a mailpiece with the address different than was intended by the mailer. The present system overcomes this difficulty by including, if desired, the number of characters in the destination address into mailpiece ID (except blanks and punctuation signs). Mail generating and processing equipment are able to determine a total number of characters in the address and compare it with the number of characters indicated in the mailpiece identifier thus providing assurance that the synchronization is in order. Other mechanisms to assure synchronization between Mailpiece identifier and the destination address are possible as well. One example would be to count the number of lines in the address or using the first alpha numeric on each line of the destination address. For added assurance, OCR can be used to confirm that the printed address matches the address for which authorization has been granted.

Pintsov discloses including the desired number of characters in the destination into a mail piece and comparing it with the number of characters indicated in the mail piece identifier this providing assurance that synchronization order.

Van Haagen discloses the following in line 24 of col.1 through lines 26 of col. 2.

> Deciber or patent applications cited above of two of the applicants herein, Leonard Storch and Ernst van Haagen, is a new and improved bar code structure called binary coded binary, BCB. BCB cannot realize its performance potential when decoded by common present day bar code decoding processes, methods and devices such as the type of reference decode algorithm systems published and described in AIM's (AIM Incorporated is an industry trade association based in Pittsburgh, Pa., Automatic Identification Manufacturers) Uniform Symbology Specifications (USS), © 1993 (copies filed herewith) and elsewhere. What has now been invented by the applicants are new bar code decode processes, methods and devices that incorporate, for example, a moving average, and begin to realize BCB's decode performance potential, including, for example: improved ability to handle extreme levels of ink spread and ink shrink distortion, the limit becomes the point where the sensing apparatus cannot resolve narrow bar code elements; and, improved ability to handle apparent and actual random edge dislocation distortion (systematic, every edge affected), referred to by applicants as edge noise; as well as improved ability to handle apparent and actual occasional greater-amplitude random edge dislocation distortion (non-systematic, occasional edges affected),

referred to by applicants as edge spikes. As it turns out, applicants' new bar code decode processes, methods and devices invented and disclosed in this present application for BCB, can also be used to decode other linear bar codes, including, by way of example, UPC, Code 128 and Code 93; UPC, Code 128 and Code 93 symbols can be decoded exactly as they are now printed. Codabar, Code 39 and Interleaved 2-of-5 can also be decoded by applicants' new decoder if they are printed using whole multiples of modules and no fractional ratios for narrow and wide elements, for example, ratios of 2:1 exactly or 3:1 exactly can be made to work with applicants' new decoder. (A module is defined by AIM as: "The narrowest nominal width unit of measure in a symbol. One or more modules are used to construct an element.") Codabar and Code 39 are discrete (not continuous) and therefore have intercharacter gaps; the intercharacter gaps must also be printed using whole multiples of modules if applicants' new decoder is to decode them with maximum accuracy.

One benefit using applicants' new decoder inventions for UPC, for example, is that the well-known 1-7 and 2-8 UPC character substitution problems can be avoided altogether (this has been a much sought after holy grail for serious bar code enthusiasts). Applicants' present inventions may be used for these and other popular (linear) bar codes, as well as for various two dimensional (2D) bar codes, such as Code 16K, Code 49, PDF 417 and others, in order to increase reading system accuracy and output productivity when high levels of ink spread, edge noise and other distortions are present. (Bar code elements in a linear bar code are disposed along one line, and in a 2D bar code the elements are disposed along two or more lines.)

Applicants also disclose novel means to precisely distort pristine bar code symbol timing count data, and means to simulate bar code decoding on computer apparatus. This, for the first time, allows controlled meaningful comparisons between different decoding processes and methods as well as between different bar code symbologies. The bar code industry was estimated in 1992 to be over $5 billion, and growing toward $20 billion by the turn of the century, yet, as of this patent filing, mean time between bar code failure data and related data is nonexistent, and worse, empirical data gleaned from various elaborate bar code reading tests conducted during the last decade is misleading. Applicants' distortion and simulation apparatus, processes and methods will allow such valuable data to become an integral part of this booming new automatic identification industry.

Van Haagen discloses a generic bar code with error correction for ink spread and ink shrink dissortation.

Whitehouse, Ryan, Pintsov and Van Haagen taken separately or together do not disclose or anticipate step C of claim 1 and those claims dependent thereon. Namely, c) determining estimates of robustness, with respect to said block of printed material, for each of said algorithms in said set to determine which of said characterizing algorithms is most robust; in order to produce descriptors that match sufficiently when said block of printer material is valid and do not match when said block of printed material is invalid; and those claims dependent thereon.

Whitehouse, Ryan, Pintsov and Van Haagen taken separately or together do not disclose or anticipate steps b1 – b4 of claim 15 and those claims dependent thereon. Namely, b1) apply each algorithm from a predetermined set of characterizing algorithms to said pristine image of said block of printed material to generate a plurality of corresponding first characterizing information descriptors for said block; b2) determine estimates of robustness, with respect to said block of printed material, for each of said algorithms in said set to determine which of said characterizing algorithms is most robust; b3) select a descriptor generated by said algorithm and being so determined to be most robust; and b4) output said selected descriptor.

Notwithstanding the foregoing, the Examiner is also required to explain how and why one having ordinary skill in the art would have been led to modify an applied reference and/or combine applied references to arrive at the claimed invention. *In re Ochiai*, 37 USPQ2d 1127 (Fed. Cir. 1995); *In re Deuel*, 51 F.3d 1552, 34 USPQ 1210 (Fed. Cir. 1995); *In re Fritch*, 972 F.2d 1260, 23 USPQ 1780 (Fed. Cir. 1992); *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988). *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S 398, 127 S.Ct. 1727, 1735 (2007) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *Id.* (quoting Kahn, 441 F.3d at 988)). *See also*,

Takeda Chem. Indus., Ltd. v. Alphapharm Pty., Ltd., 492 F.3d 1350, 1357 (Fed. Cir. 2007) (To avoid improper use of hindsight, the Examiner must articulate "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does" in an obviousness determination. (quoting *KSR*, 127 S. Ct. at 1731)).

See also, In re Kahn, 441 F.3d 977 (Fed. Cir. 2006)(Most inventions arise from a combination of old elements and each element may often be found in the prior art. However, mere identification in the prior art of each element is insufficient to defeat the patentability of the combined subject matter as a whole).

B. Claims 5, 9, and 13 are have been rejected by the Examiner under 35 USC § 103(a) over Whitehouse in view of Ryan, Jr. et al. in further view of Pintsov et al. in further view of Van Haagen et al. in further view of Ulvr et al., U.S. Patent No. 5,602,382.

In addition to the arguments made in above please consider the following.

Ulvr discloses the following in the abstract.

> A bar code for mail pieces uses bars each of which has four possible states. Two different bars indicate the start of the code and the same two bars in the same order indicate the end of the code. A data content identifier follows the start bars and this indicates the structure and length of the following data field so that when the code is read it will be recognized and read properly. The use of the data content identifier allows the code to be used for different customer and Post Office applied applications in which the code structure, length and content varies. The data field may contain a postal code with or without an address locator, a machine ID, customer information and service information. The code may include a country code field for mail pieces that are being mailed to a different country. The code may also include a field indicating whether the codeword is complete or whether it has to be concatenated with a preceding or subsequent codeword. Error protection in all cases is provided by a Reed-Solomon parity field following the data field. For customer applied codes this parity field may be made shorter than for Post Office applied codes because the potential for error in printing the code by the customer is less in view of the fact that he has more control over the paper quality, color, extraneous markings, etc.

Ulvr discloses a bar code that contains different information in different fields.

The art cited by the Examiner does not disclose or anticipate an unknown that contains information about an algorithm that is used to determine which characterizing algorithm is most robust in order to produce descriptors that match sufficiently when the block of printed material is valid and do not match when the block of printed material is involved.

In conclusion, Appellant respectfully submits that the final rejection of claims 1-17 is in error for at least the reasons given above and should, therefore, be reversed.

Respectfully submitted,

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CLAIMS APPENDIX

1. A method for selecting a characterizing algorithm for generating a characterizing information descriptor for a selected block of printed material, where said printed material is to be scanned from an object and compared with said characterizing information descriptor at a location distant from where said block is printed, said method comprising the steps of:

a) printing said block on an object;

b) applying each algorithm from a predetermined set of characterizing algorithms to a pristine image of said block of printed material to generate a plurality of corresponding first characterizing information descriptors for said block;

c) determining estimates of robustness, with respect to said block of printed material, for each of said algorithms in said set to determine which of said characterizing algorithms is most robust; in order to produce descriptions that match sufficiently when said block of printed material is valid and do not match when said block of printed material is invalid; and

d) selecting a descriptor generated by said algorithm and being so determined to be most robust to be used at said distant location.

2. The method as described in claim 1 wherein said step c) comprises the sub-steps of:

c1) filtering said pristine digital image of said block of printed material with a print/scan filter to create a filtered image, said print/scan filter simulating the expected transformation of said pristine image by printing and scanning processes;

c2) applying each algorithm from said predetermined set of characterizing algorithms to said filtered image to generate a plurality of corresponding second characterizing information descriptors for said filtered digital image; and

c3) for each algorithm from said predetermined set of characterizing algorithms, comparing corresponding said first and said second descriptors to determine which of said characterizing algorithms is most robust.

3. The method as described in claim 2 where said object is a mail piece and said block of printed material represents an address.

4. The method as described in claim 3 where said selected descriptor is comprised in an indicium printed on said mail piece; whereby said selected descriptor can be recovered from said indicium for use at said remote location.

5. The method as described in claim 4 where said indicium further comprises information identifying said algorithm so determined.

6. The method as described in claim 2 where said selected descriptor is one of said second descriptors.

7. The method as described in claim 1 where said object is a mail piece and said block of printed material represents an address.

8. The method as described in claim 7 where said selected descriptor is comprised in an indicium printed on said mail piece; whereby said selected descriptor can be recovered from said indicium for use at said remote location.

9. The method as described in claim 8 where said indicium further comprises information identifying said algorithm so determined.

10. The method as described in claim 1 wherein said step c) comprises the sub-steps of:

c1) filtering said pristine digital image of said block of printed material with a print/scan filter to create a filtered image, said print/scan filter

simulating the expected transformation of said pristine image by printing and scanning processes;

c2) further filtering said filtered image with one or more defacing filters, said defacing filters simulating blots, smudges, failure of print elements or scanner sensors, or other, similar occasional events which can not easily be incorporated into said print/scan filter to create one or more defaced images;

c2) applying each algorithm from said predetermined set of characterizing algorithms to said filtered image and to said one or more defaced images to generate a plurality of corresponding second characterizing information descriptors for said filtered digital image and one or more pluralities of defaced image descriptors corresponding to each of said one or more defaced images; and

c3) for each algorithm from said predetermined set of characterizing algorithms, comparing corresponding first characterizing information descriptors with corresponding second characterizing information descriptors and with each of said one or more corresponding defaced image descriptors to determine which of said characterizing algorithms is most robust.

11. The method as described in claim 10 where said object is a mail piece and said block of printed material represents an address.

12. The method as described in claim 11 where said selected descriptor is comprised in an indicium printed on said mail piece; whereby said selected descriptor can be recovered from said indicium for use at said remote location.

13. The method as described in claim 12 where said indicium further comprises information identifying said algorithm so determined.

14. The method as described in claim 10 where said selected descriptor is one of said second descriptors.

15. A secure indicia printing system for generating and printing an indicium on an object, said object having other material printed thereon, comprising:

a) a printer for printing said indicium;

b) a processor for receiving a pristine digital image of said other printed material, and for processing said image to abstract characterizing information descriptive of aspects of said image from said image, said processor being programmed to:

b1) apply each algorithm from a predetermined set of characterizing algorithms to said pristine image of said block of printed material to generate a plurality of corresponding first characterizing information descriptors for said block;

b2) determine estimates of robustness, with respect to said block of printed material, for each of said algorithms in said set to determine which of said characterizing algorithms is most robust;

b3) select a descriptor generated by said algorithm and being so determined to be most robust; and

b4) output said selected descriptor;

c) a meter, said meter communicating with said processor to receive said descriptor, and having a communications link for receiving other information from another information source, and communicating with said printer, for:

c1) cryptographically authenticating said descriptor and other information;

c2) generating said indicium to be representative of said cryptographically authenticated descriptor and information; and

c3) controlling said printer to print said indicium on said object; whereby

d) said object's relationship to said indicium can be verified by regenerating said first characterizing information descriptor from said other printed material and comparing said regenerated descriptor with said descriptor recovered from said indicium, and copies of said indicium cannot easily be used

without detection on other objects which do not include said other printed material.

16. The system as described in claim 15 where said processor is programmed to carry out said programming step b2) by:

b2.1) filtering said pristine digital image of said block of printed material with a print/scan filter to create a filtered image, said print/scan filter simulating the expected transformation of said pristine image by printing and scanning processes;

c2) applying each algorithm from said predetermined set of characterizing algorithms to said filtered image to generate a plurality of corresponding second characterizing information descriptors for said filtered digital image; and

c3) for each algorithm from said predetermined set of characterizing algorithms, comparing corresponding said first and said second descriptors to determine which of said characterizing algorithms is most robust.

17. The system as described in claim 15 where said processor is programmed to carry out said programming step b2) by:

b2.1) filtering said pristine digital image of said block of printed material with a print/scan filter to create a filtered image, said print/scan filter simulating the expected transformation of said pristine image by printing and scanning processes;

b2.2) further filtering said filtered image with one or more defacing filters, said defacing filters simulating blots, smudges, failure of print elements or scanner sensors, or other, similar occasional events which can not easily be incorporated into said print/scan filter to create one or more defaced images;

b2.3) applying each algorithm from said predetermined set of characterizing algorithms to said filtered image and to said one or more defaced images to generate a plurality of corresponding second characterizing information descriptors for said filtered digital image and one or more pluralities

of defaced image descriptors corresponding to each of said one or more defaced images; and

b2.4) for each algorithm from said predetermined set of characterizing algorithms, comparing corresponding first characterizing information descriptors with corresponding second characterizing information descriptors and with each of said one or more defaced image descriptors to determine which of said characterizing algorithms is most robust.

IX. EVIDENCE APPENDIX

There is no additional evidence to submit.

X. RELATED PROCEEDING APPENDIX

United States Patent Application Serial No. 10/736,077 entitled “Method And System For Generating Characterizing Information Descriptive Of Selected Printed Material Such As A Particular Address Block” is presently on Appeal to the Board of Appeals.

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